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## SPATIO-TEMPORAL ANALYSIS OF PNUMONIA MORTALITY IN MARATHWADA REGION OF MAHARASHTRA STATE (INDIA)

Dr. Kale V. P. Asst. Professor in Geography , Vitthalrao Shinde Arts College, Tembhurni.Dist. Solapur (Maharashtra)



## ABSTRACT

Health is considered as a major determinant of happiness. The link between health and development is very close. Creativity of human being is depended on his health condition. In this context, Medical Geography as a branch of human geography deals with such aspects. Pneumonia remains a global public health problem even though it's causative organism was discovered and highly effective medicines and vaccines are available for cure them, have been known for a long time. India is the highest Pneumonia burden country in the world and accounts 20 percent of global burden of Pneumonia.

The data regarding Pneumonia has been collected from vital statistics published by government of Maharashtra. The present study attempts to evaluate the Spatio-temporal analysis of Pneumonia mortality in Marathwada region of Maharashtra state. The objective of this research paper is to study the distributional pattern and correlation between various geographical and socio-cultural factors and mortality of Pneumonia in the study region. The researcher proposes to analyze the available data at various stages is being calculated using various statistical methods. The collected data has correlated with different physical and socio cultural variables. The distributional pattern of Pneumonia is to be investigated at district level. The data collected for 35 years period has been analyzed by Choropleth methods, Standard Mortality Rate (S. M. R.), simple ranking technique and Karl Pearson's correlation method is used for understanding comparison, distributional pattern and correlation between various factors and Pneumonia. Class intervals for distribution is decided by percentile method.

The study reveals that various climatic phenomena such as temperature, humidity, rainfall, sunshine and altitude partially contribute in the occurrence of the Pneumonia in the study region. Moreover, various cultural factors such as economic status, housing conditions, occupational structure, level of industrialization and environmental sanitation contribute significantly in the occurrence and transmission of the Pneumonia. Poverty, low vitality, overcrowding urban areas, Smoking, faulty dietary pattern, malnutrition, social customs, lack of timely and adequate treatment facilities and poor sanitation are some of the causes responsible for Pneumonia mortality in the study region.

**KEYWORDS:** Health, Pneumonia mortality, Geographical and Socio-cultural factors, Medical Facilities, Standard Mortality Rate.

### **INTRODUCTION**

Today Health is an important aspect of human being. Health of the individual closely related to the various geographical factors. Geographical factors are more influencing and they determine the health of individual and the community. The link between health and development are very close. Health can considered as a factor of development and major determinant of happiness.

The idea that place and location can influence health is a very old and familiar concepts in the western medicine. Since Hippocrates, it has been known that certain diseases seen to occur in some places and not in others or the intensity of some diseases is usually 'region specific'.

It is important for a medical geographer to study geography in respect of pathogens. In this connection, the main aim of medical geography is to study and analyze the geographical factors, which are responsible for the areal distribution of diseases and for health conditions.

The relationship between environmental factors and distribution of diseases has been well recognized. The ecological (environmental) factors, which are favourble for the growth, transmission and spread of an infective agent, often produce an aerial distribution pattern. Some diseases (impose) have greater morbidity in particular regions due to dominance of certain conditions that given rise to an intra-regional ecological synthesis which is the most favorable breeding ground for a disease. Such a synthesis needs a specific combination of multiple conditions related to the cultural, economic and physical aspects of a region.

According to Misra, R.P (2007), Medical geography is concerned with four aspects of health, 1) it studies the spatial patterns of health and ill health at all possible levels: global to local. 2) It (medical geography) studies the intensity and frequency of the problems encountered: degree of morbidity and mortality; periodicity of occurrence, the characteristics of the population affected: age, sex, rural-urban, agricultural, industrial, and the natural as well the physical environment settings of the regions affected. 3) It studies the determinants of health and ill health by testing etiological hypotheses to identify underlying causes or risk factors and. 4) it provides models for policy analysis, planning and programming of health services (Misra, R.P.2007).

### **IMPORTANCE OF FIELD OF MEDICAL GEOGRAPHY:**

Medical geography is multidimensional body of knowledge and at the same time, it is a multifaceted approach aimed towards understanding the spatial aspects of human health problem. (Shaskin,1962).

Armstrong (1965) defines medical geography as a subject concerned with the distribution and comparison of various indices of diseases in human (or animal) population, and the inter-relation with other elements of physical, biological and cultural environment in space.

Thus, medical geography is a spatial analysis of health and diseases, diseases diffusion processes, social and political ecology, and health service delivery systems as well as it focuses on contagious infectious diseases, vectored diseases, and newly emerging diseases.

### THE CONCEPT OF GEOGRAPHICAL EPIDEMIOLOGY:

Epidemiology is a branch of medical science. It is closely related to the geography because both medical geography and epidemiology share a common interest in the occurrence, distribution and determinants of states of health in human populations. Both rely on similar data sources and survey methods (Husain Majid, 1994).

Epidemiology concerns with the study of the distribution, frequency and determinants of health related conditions in populations, and the application of this study to control disease (Rais Akhtar; Nilofar Izha-Boutros- Pierre Mansourian, 2010).

Epidemiology is a method of reasoning about disease that deals with biological inferences derived from observations of disease phenomena in population groups' (Lilienfeld, D.E., 1998). While medical geography is the application of geographical methods and skills to medical problems (McGlashan, 1973).

The modern concept of Epidemiological surveillance is the surveillance of epidemiological study of a disease as a dynamic process involving the ecology of the infectious agent the host the reservoirs the vectors

and the environment as well as the complex mechanisms concerned in the spread of infection and the extent to which the spread occurs" (Park and Park, 1977).

Geographical epidemiology is the systematic study of the spatial distribution and disease with reference to physical and cultural environmental hazards and communicable disease. This part of study becomes the domain of health care management. It also includes health planning in which improved health services are to be planned and executed (Karande H.Y., 2005).

### **CHOICE OF THE REGION:**

The researcher has selected the Marathwada division with specific purpose. As medical geography in concerned with can analysis study of areal distribution of diseases and its relationship to the existing environmental, the physic-socio-cultural factors are the main (major) aspects which serve to explain diseases and other conditions of health.

The area under study comprises of eight (8) districts of Marathwada region namely Aurangabad, Beed, Jalna, Nanded, Osmanabad, Latur, Parbhani and Hingoli (Hingoli district separated from Parbhani at May 1999). These eight districts having the midyear total population is 15964000, which is 16.68 of the total population of Maharashtra. (2005), rural population of these eight districts is 11651300, which is 19.89% of the total population of Maharashtra, and urban population is 431290, which is only 9.51% of the total urban population of Maharashtra and the study region includes 2 corporations and 51 municipalities.

This study region is heterogeneous in nature, in case of Physiography climate, soils, vegetation, drainage patterns, rainfall, occupation, social factors, sex ratio, urbanization, industrialization etc. The latitudinal and longitudinal extent of the area is  $17^0 35^1$  North to  $20^0 40^1$  North and  $74^0 40^1$  East to  $78^0 15^{\circ}$  East respectively. Marathwada region in located in the (south) central part of Maharashtra state and covers 64813 km<sup>2</sup> (21.04 percent) area and 16.68 percent population of Maharashtra state.

The environmental factors of this region may cause the larger morbidity and mortality of certain infectious and parasitic diseases.

### **OBJECTIVES OF STUDY:**

- I. To study the distributional pattern of Pneumonia in the study region
- II. To study the correlation between various factors and Pneumonia in the study region.
- III. To recommend the viable measures for controlling the mortality rate of Pneumonia



### **METHODOLOGY:**

The researcher proposes to analyze the available data at various stages is being calculated by using various statistical methods. The collected data has correlated with different physical and socio cultural variables. The distributional pattern of pneumonia is to be investigated at district level. The data collected for 35 years period, has been analyzed by choropleth methods, Standard Mortality Rate (S. M. R.) technique, Ranking technique and Karl Pearson's correlation method is used for understanding comparison, distributional pattern and correlation between various factors of pneumonia. The data regarding deaths by pneumonia has been collected from vital statistical report published by government of Maharashtra.

Class intervals for distribution are decided by percentile method. The various graphical and distributional methods are used for showing distribution.

### **EPIDEMIOLOGY OF DISEASE PNEUMONIA:**

Pneumonia is a lung disease caused by inflammation. The disease pneumonia results from infection by virus, bacteria, fungi or other microbes. In most cases, a person gets pneumonia by inhaling viruses or bacteria. The droplets are spreads into the air when an infected person coughs or sneezes. Some time in many cases of pneumonia result when bacteria, which are normally present in the mouth, nose and throat, invade the lungs.

In most of the cases, pneumonia results from infection by bacteria is called pneumococcal and also is called mycoplasma pneumonia which occurs mainly among children inflammation is likely to be set up by sudden change from warm to cold air or by air polluted by some toxic substances (The world book, 1994, p.67). Conditions and risk factors that predispose to pneumonia include: smoking, immunodeficiency, alcoholism, chronic obstructive pulmonary disease, chronic kidney disease, and liver disease. The use of acid-suppressing medications -such as proton-pump inhibitors or H2 blockers- is associated with an increased risk of pneumonia. Old age also predisposes pneumonia.

### **1. SPATIO- TEMPORAL DISTRIBUTION:**

Pneumonia is an important urban dominated disease in the study region. In the rural parts of study region, the intensity of this disease is low as compared to urban region.

The table 1 shows the death rate of pneumonia in the study region and the figure 2 reveals the spatial distribution of the disease. The table shows that the regional average death rate of pneumonia is 2.03 per lakh population and the state average is 13.98 per lakh population. The regional average is extremely below the state average. There are several districts in the state, which have very high mortality rate by pneumonia.

	S.I	M.R. AND RA	NKING OI	F AVERAG	E DEATH	<b>RATE BY</b>	PNEUMO	NIA		
Sr.	District Name		1971	1976	1981	1986	1991	1996	2001	1971
No.			То	То	То	То	То	То	То	То
			1975	1980	1985	1990	1995	2000	2005	2005
		Death R.	5.04	3.08	3.71	7.06	3.45	0.70	1.52	3.51
1	Aurangabad	S.M.R.	197	139	163	230	173	84	130	173
1 Au		Rank	Ι	I	Ι	Ι	1	V	П	1
		Death R.	-	-	2.26	2.80	1.36	1.59	1.33	2.48
2	Jalna	S.M.R.	-	-	100	91	68	192	114	122
		Rank	-	-	111	IV	VII	1	IV	II
		Death R.	1.83	1.83	1.98	1.82	1.59	0.929	0.37	1.48
3	Beed	S.M.R.	71	82	87	59	80	112	32	73

# Table 1 MARATHWADA REGION S M R AND RANKING OF AVERAGE DEATH RATE BY PNELIMONIA

SPATIO-TEMPORAL ANALYSIS OF PNUMONIA MORTALITY IN MARATHWADA REGION OF .....

		Rank	III	IV	IV	VI	VI	Ш	VII	V
		Death R.	0.89	2.69	2.92	3.06	1.80	0.80	1.49	1.95
4	Nanded	S.M.R.	35	121	129	100	90	96	127	96
		Rank	V	П	П	III	Ш	IV	Ш	III
		Death R.	1.56	1.02	1.63	1.82	2.20	0.58	1.033	1.41
5	Osmanabad	S.M.R.	61	46	72	59	111	70	88	69
		Rank	IV	V	VI	V	П	VI	V	VII
		Death R.	-	-	VI         V         II         VI           1.76         1.64         1.76         0.93           78         53         88         112	0.933	1.63	1.47		
6	Latur	S.M.R.	-	-	78	53	88	112	139	72
		Rank	-	-	V	VII	V	П	1	VI
		Death R.	3.48	2.46	1.50	3.28	1.77	0.29	0.81	1.94
7	Parbhani	S.M.R.	136	112	66	107	89	35	69	96
		Rank	II	III	VII	Ш	IV	VII	VI	IV
Study I	Region	Death R.	2.56	2.22	2.25	3.07	1.99	0.83	1.17	2.03
		S.M.R.	100	100	100	100	100	100	100	100
Mahar	ashtra State	Death R.	24.03	20.01	16.43	15.13	10.53	8.45	3.25	13.98

*Source:* Computed by Authors based on Annual Vital statistics Report published by Govt. of Maharashtra, 1971 to 2005.

*Note:* Death Rate (up to 1980) of Jalna and Latur Districts are included in their Parent Districts.





The distribution of pneumonia is not equal in all districts. The figure shows that very high mortality rate is in only Aurangabad district and it is 3.51 per lakh population. The pneumonia is an epidemic disease spread by air. In Aurangabad district, the pollution level is high. Pneumonia is an urban incidence disease. Proportion of urban population is high in Aurangabad district than other. Therefore, the incidence of pneumonia is highest while Jalna, Parbhani and Nanded districts have high mortality rate. The mortality rate of these districts is 1.83 to 2.83 per lakh population. Three districts out of seven have low mortality rate and it is between 1.01 to 1.59 per lakh population. The lowest mortality rate is in Osmanabad district i.e.1.41 per lakh population. In the study region, there is not a single district, which has moderate and very low mortality rate.

The mortality rate of disease pneumonia has increasing trend from 1976 - 1980 to 1986 - 1990. Then this rate is decreased to the years to 2000. But it is increased again between the years 2001-2005. In the state, mortality rate of disease pneumonia has decreasing trend. In the study region, average death rate between 1971 to 1975 is 2.56 per lakh population which is decreased up to 1.17 per lakh population between the years 2001 to 2005. In the same period, the state average is decreased from 24.03 to 3.25 per lakh population.

### 2. PROMINENT AREA:

The spatial distribution of pneumonia from 1971 to 2005 is shown in the figure 2. The distribution is uneven in the study region. There are some districts, which has continuous high mortality rate. The favorable conditions may cause the higher mortality. These districts could be marked as the prominent areas of the pneumonia.

Aurangabad, Jalna, Parbhani and Nanded have continuously high mortality rate. Therefore, these four districts are prominent areas of pneumonia. The northern area of the study region is prominent area of disease pneumonia. The industrial development may cause for air pollution.

### 3. CORRELATION FACTOR:

The different environmental and social factors are responsible for the spread of the disease pneumonia. The table 2 shows the correlation between various factors and pneumonia.

The correlation between maximum temperature and death rate by pneumonia is observed positive in the study region and also in the state. All districts except Aurangabad and Beed have positive correlation. In the prominent area, there is no uniformity in correlation.

The correlation between minimum temperature and death rate by pneumonia is observed negative in the study region and in the state also. Four districts in the study region have negative and three have positive correlation. This shows that minimum temperature affects mortality adversely. Lower temperature causes higher mortality. In the prominent area, there is no uniform correlation.

Sr.	District	Max.	Min.	Avg.	Avg.	Total	Infant	Density	Literac	House
No.		Tem	Temp.	Tem	Rainfal	Deat	Mortali	Of	у	Occupa
		р.		р.	I	h	ty	Populati		ncy
						Rate	Rate	on		Ratio
1	Aurangabad	-0.17	-0.78	-0.47	0.28	0.51	0.51	-0.66	-0.54	0.40
2	Jalna	0.40	-0.95	-0.41	0.50	0.91	0.91	-0.87	-0.75	0.76
3	Beed	-0.47	-0.61	-0.66	-0.18	0.54	0.69	-0.91	-0.88	0.99
4	Nanded	0.69	-0.31	-0.17	0.67	0.18	0.21	-0.38	-0.37	0.50
5	Osmanabad	0.08	0.56	0.61	-0.17	0.04	0.22	-0.46	-0.26	0.46
6	Latur	0.18	0.53	0.60	-0.74	0.79	0.44	-0.42	-0.47	0.44
7	Parbhani	0.45	0.31	0.42	0.16	0.67	0.80	-0.80	-0.77	0.79
Study	y Region	0.17	-0.38	-0.12	0.19	0.52	0.65	-0.82	-0.74	0.84
State	e Average	0.28	-0.75	-0.48	0.33	0.87	0.96	-0.99	-0.98	0.94

# Table 2 MARATHWADA REGION

Source: Computed By Authors.

The correlation between average temperature and deaths by pneumonia is slightly observed negative in the study region and in the state also. Four districts have negative and three have positive correlation. In the prominent area, there is negative correlation.

The correlation between rainfall and deaths rate by pneumonia is observed slightly positive in the study region and in the state also. Four districts have positive and three districts have negative correlation. In the prominent area, there is positive correlation. It means that high rainfall causes for high deaths by pneumonia.

MAX. TEMP	TEMP	TEMP	RAINFALL	RATE	I.TI.K.	OF POP		OCCUPANCY
_	MIN	AVG.	AVG.	DEATH	IMP	DENSITY	LITERACY	HOUSE
	-J-					-B-		
						-J-	-B-	
1	-A-		-L-			-P-	-P- <sup>-J-</sup>	
-		-B-				-A-		
	-B-							
							-A-	
-B-		-J- -A-				-L- -O-	-1-	
						-N-	-N-	
	-N-						-0-	
-A-		-N-	-B- <sup>-O-</sup>					
	_			CONC.				
-0-				-0-				
-1-			-P-	-N-	-0N-			
			-A-		0.5			
	P							- As
-P-		-P-	in the second		-b-			-0- -L-
	-0- -L-		.1.	-B- -A-	-A-			N
-[N-		-1-0-	-N-	-P-	-D-			
					R			-J-
1				-b-	-P-			-P-
_				-J-	-J-			
	-N- -J- -O-	-N- -P- -J- -J- -O- -A- -B- -B- -B- -A-	-N. -N. -P. -P. -P. -P. -P. -P. -P. -P	-NNNN -Q - -Q - -Q - -Q - - - - - - - - - - - - - - - - - -	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

### MARATHWADA REGION CORRELATION BETWEEN VARIOUS FACTORS AND PNEUMONIA

The correlation between total death rate and death rate by pneumonia is observed positive in the region and it is significantly positive in state also. All districts have positive correlation. This shows that the increase in the deaths by pneumonia causes for the increase in total death rate and decrease in deaths by pneumonia causes for the decrease in total death rate. Therefore, there is need of implementation of pneumonia control programs.

The correlation between infant mortality rate (I.M.R) and death rate by pneumonia is positive in the study region and in the state also. All districts have observed positive correlation. This shows that the pneumonia has affected the I.M.R. directly. The pneumonia is an important cause for infant deaths in postnatal mortality. The direct contact comes with environment in this age. In the prominent area, it is also positive correlation.

The correlation between density of population and death rate by pneumonia is observed significantly negative in the study region and in the state also. All districts in the study region have negative correlation. The mere contact does not spread the disease pneumonia. There is need of close contact for spread of this disease.

The correlation between literacy rate and death rate by pneumonia is observed significantly negative in the study region and also in the state. The literate people take care of their health because they are aware about health. Therefore, the mortality rate by pneumonia is low.

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The correlation between house occupancy ratio and death rate by pneumonia is observed significantly positive in the study region and also in the state. All districts in the study region have observed positive correlation. This shows that the large families have more chances of close contact. The close contacts cause for spread of pneumonia in the densely family. There is need of optimum place for each person to control the spread of pneumonia in the family.

## 4. STANDARD MORTALITY RATE:

The standard mortality rate for disease pneumonia is calculated. The table 1 shows the S.M.R. in the study region. Two districts' S.M.R. is above the regional average. The highest S.M.R. is in Aurangabad (173). Aurangabad district is a prominent area of pneumonia. Out of seven districts, five districts S.M.R. below the regional average. The lowest S.M.R. is observed in the Osmanabad districts (69).

	197	1-75	197	6-80	198	1-85	198	6-90	199	1-95	1996	-2000	200	1-05	1971	-2005
O.M.R.	107	D.R.	100	D.R.	100	D.R.	100	D.R.	100	D.R.	1001	D.R.	201	D.R.	1051	D.R.
10		0.256		0.222		0.225		0.307		0.199		0.083		0.117		0.190
20		0.512		0.444		0.450		0.614		0.398		0.166		0.234		0.392
30	-IN-	0.768		0.666		0.675		<mark>0.921</mark>		0.597	-r-	0.249	-B-	0.351		0.588
40		1.024		0.888		0.90		1.228		0.796	P	0.932		0.468		<b>0.78</b> 4
50		1.28	-0-	1.11		1.125	-L-	1.535		0.995		0.415		0.585		0.98
60	-0-	1.536		1.332		1.35	- <b>D</b> -	1.842		1.194		0.498		0.702		1.176
70	-B-	1.792		1.556	-0- -P-	1.575		<mark>2.14</mark> 9	-J-	1.993	-0-	<mark>0.58</mark> 1	-P-	0.819	-0-	1.372
80		2.048	-B-	2.776	-L-	1.80		2.456	-B-	1.592	-A-	0.664		0.936		1.568
90		2.304		1.998	-B-	2.025	-J-	2.763	-P <sup>-N-</sup> -L-	1.791		0.747	-0-	1.053		1.764
100		2.56	-R-	2.22	-J-R-	2.25	-N-R-	3.07	-R-	1.99	-R- -N-	0.83	-R-	1.17	-R- -P-N-	1.96
110		2.816	-P-	2.442		2.475	-P-	3.377	-0-	2.189	-L-B-	0.913		1.287		2.156
120		3.072	-N-	2.664		2.70		2.684		2.388		0.996	-le	<b>1.404</b>	-J-	2.352
130		3.328		2.886	-N-	2.925		<b>3.991</b>		2.587		1.079	-A- -N-	1.521		2.548
140	-A-	3.584	-A-	3.108	-A-	3.15		4.298	-A-	2.786	-J-	1.162	-L-	1.638	-A-	2.744
240		6.144		5.328		5.40	-A-	7.368		4.776		1.992		2.808		4.704

### MARATHWADA REGION S.M.R. AND DEATH RATE BY PNEUMONIA



#### MARATHWADA REGION DISTRICT WISE RANKING OF THE DISEASE PNEUMONIA

### 5. RANKING OF DISEASE:

The ranking shows the prominent area of the disease. The ranking of the disease pneumonia is shown in the table 1. The table shows that the district Aurangabad has first rank and Jalna has second rank. Aurangabad district has higher ranks from 1971 to 1995. Nanded and Parbhani have third and forth ranks respectively. These districts have always-higher mortality rate. The lowest rank is observed in Osmanabad. Other districts, Beed and Latur have lower ranks.

### 6. CONCLUSION AND SUGGESTIONS:

This research paper shows the important findings of district wise Spatio-temporal distribution of Pneumonia in Marathwada region. The whole analysis is based on death rate, correlation factors, standard mortality rate and simple ranking techniques. Pneumonia is the major cause of death in the study region. The regional average death rate of Pneumonia is 2.03 per lakh population but the state average is 13.98. It means that other districts in the state have high mortality rate of Pneumonia.

It is found that the mortality rate of Aurangabad and Jalna districts is high which is above 2.03 per lakh population. In the study region, disease Pneumonia is associated with number of organic as well as inorganic factors such as temperature, humidity, rainfall, sunshine and altitude. These factors partially contribute in the occurrence of the disease Pneumonia.

Various cultural factors such as economic status, housing conditions, occupational structure, level of industrialization and environmental sanitation also contribute significantly in the occurrence and transmission of the Pneumonia. Poverty, low vitality, overcrowding urban areas, faulty dietary pattern, malnutrition, social customs, lack of timely and adequate treatment facilities and poor sanitation are some of the causes responsible for Pneumonia mortality in the study region.

The positive correlations have observed with Pneumonia and total death rate, infant mortality rate and house occupancy ratio in the study region.

The mortality rate of the study region is decreased from 2.56 per lakh population during the years 1971 – 1975 to 1.17 per lakh population during the years 2001 - 2005. In this period, the state average is decreased from 24.03 to 3.25 per lakh population. The trend of mortality rate of Pneumonia is decreased due to the Pneumonia Control Programme. The mortality rate of all the districts in study region is decreased in 1971 to 2000. But after 2000, it is again increased. So there is need and necessity of the awareness and implementation of Pneumonia controlling programmes.

Prevention of Pneumonia includes vaccination, environmental measures and appropriate treatment of other health problems. It is believed that, if appropriate preventive measures and proper treatment were instituted the mortality rate among children can be reduced in the study region. Vaccination prevents against certain bacterial and viral pneumonias both the children and adults.

The Disease Control and Prevention (CDC) suggest that yearly vaccination for every person of six months and older, which cause decreases in the mortality rate of Pneumonia. Immunization decreases the risk of viral pneumonia. Ceasing smocks and reducing indoor air pollution, such as that from cooking indoors with wood or dung. Smoking appears to be the single biggest risk factor for pneumococcal pneumonia in otherwise-healthy adults. Hand hygiene and coughing into one's sleeve may also be effective preventative measures. Wearing surgical masks by the sick may also prevent illness. Appropriately, treat-underlying illnesses, such as HIV/AIDS, Diabetes mellitus, and Malnutrition can decrease the risk of pneumonia. In children less than 6 (Six) months of age, exclusive breast-feeding reduces both the risk and severity of disease Pneumonia.

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